selection: for, admitting Professor Brooks's doctrine, that each individual inherits *all* the characteristics of the species, and that the female function prevents the development of the male characters (though they may appear when that function is destroyed), it is plain that those characters are either incompatible with the female function or useless to the female, and hence there is no reason why she should acquire them; while their presence in the male, to which they are of obvious advantage, is in most cases to be accounted for by sexual selection. On the other hand, it is obvious that all the complex apparatus of uterus, placenta, and similar organs, must have originated with the female. We cannot agree with Professor Brooks, that the presence of mammae in the male is an indication that the mammary function was originally a male characteristic, any more than that the presence of rudimentary stridulating organs in female Orthoptera shows that these were first acquired by the female. Why should Professor Brooks adopt exactly opposite explanations for precisely parallel cases?

The propagation of cells by means of gemmules is not only purely hypothetical, but, apparently at least, opposed to what we know of the mode of cell-formation. Cells arise only by division of some pre-existing cell, and never seem to arise spontaneously, as would very probably be the case if their propagation by gemmules were at all common. Nor does the process of impregnation, as actually observed, lend support to the new hypothesis; for the head of the spermatozoon coalesces with the nucleus of the ovum, apparently without loss of bulk, or in any way indicating an emission of gemmules. The influence of the male element seems rather to consist in modifying the action of the egg-nucleus.

Mr. Conn's very obvious objection (given on p. 294), that in many cases unfavorable conditions would not act upon certain cells, causing them to emit gemmules, but would result in the destruction of the animal, seems entitled to more weight than the author is inclined to give it. Any hypothesis that fails to account for so large and important a class of facts cannot be called complete.

Want of space compels the omission of many other objections, as well as the consideration of Professor Brooks's views on reversion, natural selection, and the intellectual differences between men and women.

But, in spite of all that has been said, Professor Brooks is entitled to the thanks of all students of biology for his clear statement of the problem, and the many suggestive fields for investigation here opened. The student of heredity will find in this book just what he needs to give him a clear conception of how the problem is to be attacked. The book is one of remarkable ability. The way in which apparently disconnected series of phenomena are brought together and shown to be special cases of one general principle, is indeed masterly. Even if every single proposition of the hypothesis should prove to be without foundation, and the hypothesis entirely untenable, Professor Brooks must always be credited with having made a most important step in advance. Assuming that the problem of heredity is at all capable of solution, some such preliminary clearing of the field is a necessity. If different observers will devote their energies to following up the various lines of inquiry which Professor Brooks has so ably suggested, we may be sure of most valuable and fruitful additions to our knowledge. To use Mr. Lewes's words, "even should the hypothesis prove a will-o'-wisp, it is worth following if we follow circumspectly, for it hovers over lands where we may find valuable material. As an hypothesis, it so links together wide classes of facts that it may be a clew to great discoveries."

WATTS'S MANUAL OF CHEMISTRY.

A manual of chemistry, physical and inorganic. By HENRY WATTS. Philadelphia, *Blakiston*, 1884. 16+595 p. 8°.

FEW text-books of chemistry have been more successful than the 'Manual of elementary chemistry' first published in 1845 by Professor George Fownes. Fownes, who was but thirty years of age at the time, held the chair of chemistry in University college, London. His work had marked success from the very beginning, and he was called upon to prepare three editions in the succeeding four years. The third, however, appeared posthumously; for Fownes died in January, 1849, at the early age of thirty-four. Under the editorship of the late Dr. H. Bence Jones, and afterwards of Dr. A. W. Hofmann, the work appeared at frequent intervals in six editions; and, notwithstanding the constant additions of large amounts of new and important matter, the familiar name 'Fownes's chemistry' was retained. The tenth edition was edited by Dr. Bence Jones and Henry Watts, and appeared in 1868; another edition, by Henry Watts, followed in 1872; and finally a twelfth, greatly increased in size, and issued in two volumes devoted to inorganic

and organic chemistry respectively, completed in 1877 the long and valuable series.

The honorable career of this standard work reminds us of that other remarkable handbook, the '*Cours de chymie*' of Nicolas Lemery, of which the first edition appeared in 1675, and the fourteenth, greatly enlarged by Baron, in 1756, eighty-one years after.

The new work by Henry Watts is confessedly "founded on the well-known manual of chemistry of the late Professor Fownes;" and, such being its origin, we are not surprised to find that it wears the garb of a familiar friend. The learned editor of 'A dictionary of chemistry' has in this manual dropped the name 'Fownes' from the titlepage, and given us a revised edition bearing his own name. And this he undoubtedly has a right to do, if one takes into consideration the great alterations and additions made in the preceding editions with which his name was associated, together with the improvements in the one before us.

The present volume commences with a short sketch of the more important elementary bodies, the principal laws of chemical combination, the principles of nomenclature, and the representation of the constitution and reactions of bodies by symbolic notation. In the preceding edition (twelfth) of Fownes the three topics last named were treated at p. 123 of the volume: here they appear at p. 7.

This introduction is followed by a section on chemical physics which has always occupied a prominent place in the several editions of Fownes. The next section contains a description of the non-metallic elements in the following order: hydrogen, chlorine and its analogues, oxygen, sulphur and its analogues, nitrogen, phosphorus, arsenic, boron, silicon, and carbon. This is succeeded by a fuller consideration of the general principles of chemical philosophy, embracing sections on quantivalence, the periodic law, crystallization, and chemical affinity. At this point is introduced the subjects of electro-chemical decomposition, or electrolysis, and the chemistry of the voltaic pile, which are thus divorced from their rational connection with the chemical physics in the earlier portion of the work. The latter half of the volume treats of the metals in their usual systematic order.

Watts's chemistry, on the whole, differs more from its predecessor in the arrangement of material than in the introduction of novelties; still, we find new paragraphs here and there, embodying late discoveries. The work shows evidences of having been rather hastily prepared. Thus, while the newly announced elements, scandium, decipium, ytterbium, and samarium, are briefly described in their proper connection (pp. 458 to 463), only two of them (Sc and Yb) obtain positions in the list of elementary bodies on p. 3. Again: under oxygen we find no mention of its liquefaction, though in the section on chemical physics the experiments of Cailletet and Pictet are, far too briefly, chronicled. Ozone fares very badly, obtaining no recognition whatever in the body of the work, and being relegated to a single page (584) at the very close of the appendix; and there it is very inadequately treated. Its liquefaction by Hautefeuille and Chappuis is not mentioned. The page is a simple condensation of the two pages given to the subject in the preceding edition of Fownes, without the addition of a single new fact. The atomic weight of antimony still appears as 122, notwithstanding the great weight of evidence in favor of 120. Meyer and Seubert make Sb = 119.6.

The well-worn woodcuts, too familiar and never very attractive, still do service in illustration. The volume contains thirty-four pages more than the English edition of the last issue of Fownes. In spite of some blemishes, however, Watts's Chemistry sustains the high reputation of its lineal ancestor, and well deserves a large patronage.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Geological survey.

Topographical work in North Carolina. — Party No. 1 of the Appalachian division was in charge of Mr. Charles M. Yeates, topographer, and, during the seasons of 1882 and 1883, surveyed the area lying between the Blue Ridge and the Tennessee line in North Carolina, with the exception of Watauga, Ashe, and Alleghany counties. This area lies between the 35th and 36th parallels, and extends from the 82d to the 84th degree of longitude, including the most mountainous portion of the state, and that which is usually designated as western North Carolina.

The state line separating North Carolina and Tennessee follows the summit of the Alleghany Range, which, in its different parts, has received various specific names; such as the 'Unaka,' the 'Bald,' and